UNITED STATES PATENT AND TRADEMARK OFFICE

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/606,437 | 06/25/2003 | Leping Huang | 883.0007.U1(US) | 6335 |

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| EXAMINER |
|---|
| NG, CHRISTINE Y |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2616 | |

DATE MAILED: 06/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

| | Application No. | Applicant(s) |
|---|---|---|
| **Office Action Summary** | 10/606,437 | HUANG, LEPING |
| | Examiner | Art Unit | |
| | Christine Ng | 2616 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) ☒ Responsive to communication(s) filed on *24 May 2006*.

2a) ☐ This action is **FINAL**.　　2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) ☒ Claim(s) *1-6,10-15,18,20,21 and 23-27* is/are pending in the application.

　　4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-6,10-15,18,20,21 and 23-27* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *25 June 2003* is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

　　Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

　　Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

　　a) ☐ All　b) ☐ Some * c) ☐ None of:

　　　1. ☐ Certified copies of the priority documents have been received.

　　　2. ☐ Certified copies of the priority documents have been received in Application No. _____.

　　　3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

　　* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
　　Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
　　Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1.    The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

2.    Claims 5, 6, 15 and 18 are rejected under 35 U.S.C. 112, second paragraph, as

being indefinite for failing to particularly point out and distinctly claim the subject matter

which applicant regards as the invention.

Referring to claims 5 and 15: It is unclear why the route with the smallest

connectivity metric value is chosen. The connectivity metric is defined as a ratio of a

maximum link bandwidth to the estimated link bandwidth. According to the

specifications, page 12 lines 24-28, the link with the larger connectivity metric has the

smaller link bandwidth, so the link with the largest connectivity metric is a bottleneck

and the link with the smallest connectivity metric is chosen. However, for example, if

the connectivity metric of link 1 is 10/5 = 2 and the connectivity metric of link 2 is 10/2 =

5, link 1 is chosen since it has the smaller connectivity metric. But, link 2 has a larger

link bandwidth since it is using only 1/5 of the bandwidth whereas link 1 is using ½ of

the bandwidth. This is unclear.

In claim 6 line 12, Bi should be changed to --$B_i$--.

In claim 6, it is unclear why the equations for the connectivity metrics in lines 13-

22 is defined as $B_i/B_o$, when the connectivity metric is the ratio of the maximum link

bandwidth to the estimated link bandwidth ($B_o/B_i$).

In claim 6 lines 18-19:

"$Master_j$" is not defined in the claim.

"PMP (S/S)" is not defined in the claim.

"$Master_j$" is not defined in the claim.

"B" is not defined in the claim.

"$B_j$" is not defined in the claim.

"$M_j$" is not defined in the claim.

In claim 6 lines 21-22:

"$Master_j$" is not defined in the claim.

"PMP ($S/M_k$)" is not defined in the claim.

"B" is not defined in the claim.

"$M_k$" is not defined in the claim.

In claim 18 line 12, "PMP" is not defined in the claim.

In claim 18 line 13, Bi should be changed to --$B_i$--.

In claim 18, it is unclear why the equations for the connectivity metrics in lines

14-23 is defined as $B_i/B_o$, when the connectivity metric is the ratio of the maximum link

bandwidth to the estimated link bandwidth ($B_o/B_i$).

In claim 18 lines 19-20:

"$Master_j$" is not defined in the claim.

"PMP (S/S)" is not defined in the claim.

"$Master_j$" is not defined in the claim.

"B" is not defined in the claim.

"$B_j$" is not defined in the claim.

"$M_j$" is not defined in the claim.

In claim 18 lines 22-23:

"$Master_j$" is not defined in the claim.

"PMP (S/$M_k$)" is not defined in the claim.

"B" is not defined in the claim.

"$M_k$" is not defined in the claim.

### Claim Rejections - 35 USC § 103

3.      The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all
obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.      Claims 1-4, 11-14, 21 and 23-26 are rejected under 35 U.S.C. 103(a) as being
unpatentable over U.S. Patent No. 6,084,858 to Matthews et al in view of U.S. Patent
No. 4,912,702 to Verbiest, and in further view of U.S. Patent No. 6,535,498 to Larsson
et al.

Referring to claim 1, Matthews et al disclose in Figure 2A a method for routing data packets in a network, comprising:

Estimating a link bandwidth (used_bandwidth(e)) of at least one network node (source A). Refer to Column 8, line 65 to Column 9, line 8.

Calculating (Step 16) a connectivity metric ($Z_p(i)$) based on the estimated link bandwidth (used_bandwidth(e)). Refer to Column 4, lines 44-48 and Column 8, line 65 to Column 9, line 8.

Distributing (using a traversal value vector) information concerning the calculated connectivity metric ($Z_p(i)$), using a routing protocol packet (traversal value vector). "Each element of the vector corresponds to a current value for one of the metrics" and "each time a destination node is discovered, a traversal value vector is updated for each node" (Column 6, lines 6-16). The traversal value vector is a "routing protocol packet" in that its metrics are updated as it traverses through a path from a source to a destination, so that the metrics can be used to determine the best path. Refer to Column 6, lines 35-39 and Column 7, lines 12-18.

Using the calculated connectivity metric ($Z_p(i)$), determining (Step 18) a route having a maximum link bandwidth and a minimum traffic load. After all paths are evaluated by the traversal value vectors, "the path which best fits the desired result for presentation is selected". Refer to Column 4, lines 50-54 and Column 7, lines 12-18 and 28-64.

Matthews et al do not disclose wherein the connectivity metro is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth.

Verbiest disclose in Figure 1 a method of transporting a packet from a source to a destination through a switching network. When a stream from RX1 is to be multiplexed onto an output terminal T1, the corresponding processor TPR1 of TX1 calculates the estimated output bandwidth B2 and compares this bandwidth with the maximum bandwidth B allowable on the output terminal T1. The comparison between the estimated bandwidth B2 and the maximum bandwidth B is made to ensure that the estimated bandwidth B2 on the output T1 does not exceed the maximum allowable bandwidth B. If B2 does not exceed B, the packet in RX1 is transmitted to TX1. If B2 exceeds B, the path set up packet searches for another path through the network. Also, it can be checked if the B2 is below a predetermined percentage, e.g. 80%, of B. Refer to Column 1, line 55 to Column 2, line 7; and Column 5, line 67 to Column 6, line 53. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include wherein the connectivity metro is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth. One would be motivated to do so in order to ensure that there will be enough available bandwidth to accommodate the data packet transmission, using the estimated bandwidth value.

Matthews et al also do not disclose that the method is used in a wireless network.

Larsson et al disclose in Figure 4 a method of selecting optimal routes between nodes in a wireless Bluetooth ad-hoc piconet. "These routes may be more optimal than the original route in terms of fewer hops between the source node and the destination node or in terms of dropped packets and network delays along the original route"

(Column 3, lines 47-50). A source node requests for an updated route to the destination

node during a predetermined event. The predetermined event could be when the traffic

throughput along the original route falls below a predetermined threshold value, when

the number of intermediate nodes in the original route exceeds a predetermined

number, or when the number of routes which flow through a node is above a

predetermined threshold. Refer to Column 2, lines 22-45; Column 3, lines 19-50; and

Column 4, line 62 to Column 5, line 32. Therefore, it would have been obvious to one of

ordinary skill in the art at the time the invention was made to include that the method is

used in a wireless network, the motivation being in order to facilitate routing in a

wireless network by finding the most efficient route for data transmissions.

Referring to claim 2, Matthews et al do not specifically disclose that the

estimating uses a model of a network medium access control MAC algorithm.

However, Matthews et al disclose that each packet has a source MAC address

and a destination MAC address to designate the route of the packet. If a packet has

multiple different paths, the best path is determined by factors such as bandwidth.

Furthermore, the path of the packet is needed in order for the system to estimate the

bandwidth required to route the packet to its destination. Refer to Column 1, lines 27-30

and Column 1, line 66 to Column 2, line 21. Therefore, it would have been obvious to

one of ordinary skill in the art at the time the invention was made to include that the

estimating uses a model of a network medium access control MAC algorithm, the

motivation being that the MAC addresses specify the source and destination of the

packet, so that the system can determine a path and estimate the bandwidth needed to route the packet.

Referring to claim 3, refer to the rejection of claim 1 and claim 2.

Referring to claim 4, refer to the rejection of claim 1. Furthermore, Verbiest disclose that the maximum link bandwidth (B) is the link bandwidth between a Master node (source SEND connected to corresponding port RX1) and a Slave node (destination RECEIVE connected to corresponding port TX1) when there is only one slave node connected to the master node. When a stream from RX1 is to be multiplexed onto an output terminal T1, the corresponding processor TPR1 of TX1 calculates the estimated output bandwidth B2 and compares this bandwidth with the maximum bandwidth B allowable on the output terminal T1. When doing the calculation, there is only one slave node (TX1) connected to master node (RX1). Refer to Column 1, line 55 to Column 2, line 7; and Column 5, line 67 to Column 6, line 53.

Referring to claim 11, Matthews et al disclose in Figure 3 a computer program embodied on a computer readable medium (memory 192) and comprising computer program code segments for use by at least one data processor (CPU 191) when implementing a routing protocol in a network. Refer to Column 10, lines 7-18. Furthermore, Matthews et al disclose sending information concerning a calculated connectivity metric (Zp(i)) to at least one other network node using a routing protocol packet (traversal value vector). "The node reports to the model what the metric values are for the node and the arcs that originate from it". Refer to Column 6, lines 6-16. Refer also to the rejection of claim 1.

Matthews et al do not specifically disclose a first computer program code, a second computer program code, a third computer program code and a further computer code to perform the steps defined in claim 1.

However, Matthews et al disclose that the memory 192 "contains a computer program or data structure for providing to a general purpose computer instructions and data for carrying out the methods". Refer to Column 10, lines 14-18. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a first computer program code, a second computer program code and a third computer program code to perform the steps defined in claim 1, the motivation being that each step of the process requires a separate set of computer instructions.

Matthews et al also do not disclose wherein the connectivity metro is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth. Refer to the rejection of claim 1.

Matthews et al also do not disclose that the computer program is used in a wireless network. Refer to the rejection of claim 1.

Referring to claim 12, refer to the rejection of claim 2.

Referring to claim 13, refer to the rejection of claim 3.

Referring to claim 14, refer to the rejection of claim 4 and claim 11.

Referring to claim 21, Matthews et al disclose receiving information concerning a calculated connectivity metric ($Z_p(i)$) from at least one other network node. "As each node is discovered, a traversal value vector is recorded for that node", with the traversal

vector including the current value for one of the metrics of the previous nodes in the

discovered path. Refer to Column 6, lines 6-16.

Referring to claim 23, refer to the rejection of claim 1 and claim 11.

Referring to claim 24, refer to the rejection of claim 2.

Referring to claim 25, refer to the rejection of claim 3.

Referring to claim 26, Verbiest disclose that the maximum link bandwidth (B) is

the link bandwidth between a Master node (source SEND connected to corresponding

port RX1) and a Slave node (destination RECEIVE connected to corresponding port

TX1) when there is only one slave node connected to the master node. When a stream

from RX1 is to be multiplexed onto an output terminal T1, the corresponding processor

TPR1 of TX1 calculates the estimated output bandwidth B2 and compares this

bandwidth with the maximum bandwidth B allowable on the output terminal T1. When

doing the calculation, there is only one slave node (TX1) connected to master node

(RX1). Refer to Column 1, line 55 to Column 2, line 7; and Column 5, line 67 to Column

6, line 53.

5.      Claims 10 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable

over U.S. Patent No. 6,084,858 to Matthews et al in view of U.S. Patent No. 4,912,702

to Verbiest in view of U.S. Patent No. 6,535,498 to Larsson et al, and in further view of

U.S. Publication No. 2003/0043746 to Hiroyuki et al.

Referring to claim 10, refer to the rejection of claim 1.

Matthews et al do not disclose that distributing information concerning the

calculated connectivity metric comprises inserting the value of the connectivity metric

(ratio of maximum link bandwidth to estimated link bandwidth) into a routing protocol packet in conjunction with the value of a hop number.

Hiroyuki et al disclose that finding an optimum path between nodes in a network comprises using a metric to compare paths. The metric can be the number of hops or the bandwidth, the goal of which is to minimize the metric in choosing a path. Refer to Paragraph 0006 and 0051. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that distributing information concerning the calculated connectivity metric comprises inserting the value of the connectivity metric into a routing protocol packet in conjunction with the value of a hop number; the motivation being that the ratio of maximum link bandwidth to estimated link bandwidth can also be used as a metric to determine the optimum path, in addition to the number of hops. A path is more likely to be selected if its estimated link bandwidth does not exceed the maximum link bandwidth, in order to support the data packet transmission.

Referring to claim 20, Matthews et al do not disclose that distributing information concerning the calculated connectivity metric comprises inserting the value of the connectivity metric (ratio of maximum link bandwidth to estimated link bandwidth) into a routing protocol packet in conjunction with the value of a hop number.

Hiroyuki et al disclose that finding an optimum path between nodes in a network comprises using a metric to compare paths. The metric can be the number of hops or the bandwidth, the goal of which is to minimize the metric in choosing a path. Refer to Paragraph 0006 and 0051. Therefore, it would have been obvious to one of ordinary

skill in the art at the time the invention was made to include that distributing information concerning the calculated connectivity metric comprises inserting the value of the connectivity metric into a routing protocol packet in conjunction with the value of a hop number; the motivation being that the ratio of maximum link bandwidth to estimated link bandwidth can also be used as a metric to determine the optimum path, in addition to the number of hops. A path is more likely to be selected if its estimated link bandwidth does not exceed the maximum link bandwidth, in order to support the data packet transmission.

6.      Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,084,858 to Matthews et al in view of U.S. Patent No. 4,912,702 to Verbiest in view of U.S. Patent No. 6,535,498 to Larsson et al, and in further view of U.S. Publication No. 2003/0119538 to Momosaki et al.

Refer to the rejection of claim 4.

Matthews et al do not disclose that estimating includes a consideration of a number of, and the role played by, other nodes that are coupled to the at least one node, where the role comprises one of a master (M), a slave (S), and a participant in multiple piconet (PMP).

Momosaki et al disclose estimating the amount of bandwidth needed in a system by determining the node's status (master or slave) and the number of the node's slaves. The total bandwidth is divided equally amongst the master and all the slaves. If the bandwidth required by each node increases, some slaves may have to be disconnected to order to accommodate the bandwidth requirement changes. Also, since the

bandwidth is shared equally amongst all nodes, the number of slaves cannot increase,

so the number of the node's slaves must be known to ensure that it does not go over

the bandwidth threshold.  Momosaki et al also disclose considering whether a node is a

master node or a slave node. The upstream device becomes a master and the

downstream devices become slaves.  Refer to Paragraphs 0075-0076.  Therefore, it

would have been obvious to one of ordinary skill in the art at the time the invention was

made to include that estimating includes a consideration of a number of, and the role

played by, other nodes that are coupled to the at least one node, where the role

comprises one of a master (M), a slave (S), and a participant in multiple piconet (PMP).

One would be motivated to do so in order to determine the network topology and to

determine the number of slaves and bandwidth required in the network, since the total

bandwidth cannot exceed the network bandwidth.  The total amount of bandwidth

required by all the nodes must not exceed the total amount of bandwidth provided to the

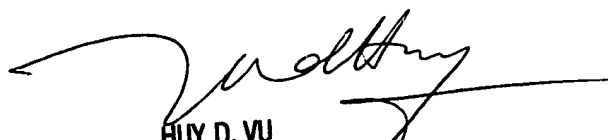system, which must be shared equally amongst all nodes.

### *Conclusion*

7.      Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Christine Ng whose telephone number is (571) 272-

3124.  The examiner can normally be reached on M-F; 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Huy Vu can be reached on (571) 272-3155.  The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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June 9, 2006

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